



Conducting research for a changing society: This is what drives us at Forschungszentrum Jülich. As a member of the Helmholtz Association, we aim to tackle the grand societal challenges of our time and conduct research into the possibilities of a digitized society, a climate-friendly energy system, and a resource-efficient economy. Work together with around 7,500 employees in one of Europe's biggest research centres and help us to shape change!

At the Institute of Energy and Climate Research – Jülich Systems Analysis (ICE-2), the ICE-2 team "Integrated Infrastructure–Distribution Infrastructure" develops synthetic, geo-referenced distribution grids for electricity, gas, and hydrogen. These efforts support the planning of robust, climate-neutral infrastructure systems by analyzing load profiles, technology placement, and sector integration. By joining us, you'll contribute to Germany's energy transition and digital transformation through cutting-edge research.

**We offer you to the next possible date an exiting**

## Master Thesis - AI-Accelerated Power Flow Analysis for Synthetic Electrical Distribution Grids

### Your Job:

- Investigate current challenges and bottlenecks in power flow analysis for large scale electrical distribution grids
- Apply machine learning/AI or surrogate modeling (e.g., neural networks, graph neural networks, physics-informed ML) to approximate PF results
- Train models using simulation results generated from conventional power flow solvers
- Evaluate AI-based approximators in terms of accuracy, generalization, and computational speed
- Integrate models with the existing synthetic grid package
- Optionally contribute to writing a scientific paper on AI-enhanced grid simulations

### Your Profile:

Required Qualifications:

- Very good performance in your Master's studies in Electrical Engineering, Computer Science, Geoinformatics, Energy Systems, or related field
- Very good knowledge of Machine Learning and AI algorithms

The job will be advertised until the position has been successfully filled. You should therefore submit your application as soon as possible. We look forward to receiving your application via our

**Online-Recruitment-System!**

**Questions about the vacancy?**

Get in touch with us by using **our contact form**.

Please note that for technical reasons we cannot accept applications via email.  
[www.fz-juelich.de](http://www.fz-juelich.de)

- Solid programming skills in Python and familiarity with machine learning libraries (e.g., scikit-learn, TensorFlow, PyTorch)
- Experience working with geospatial data (e.g., geopandas, rasterio, shapely).
- Understanding of electrical power systems, especially power flow basics
- Experience or interest in applying machine learning to engineering simulations
- Strong analytical skills, ability to communicate and document research results clearly in English (B2)

Desirable Qualifications:

- Experience with GIS tools and libraries (QGIS, GDAL), power system simulation tools (e.g., PyPSA, pandapower, etc)
- Knowledge of surrogate modeling, GNNs or Physics-Informed ML
- Experience with academic writing or contributions to scientific papers
- High level of independence, motivation, and a structured, reliable work approach
- Good team skills and willingness to engage in interdisciplinary collaboration

Please feel free to apply for the position even if you do not have all the required and desirable skills and knowledge.

#### **Our Offer:**

We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! We support you in your work with:

- **MEANINGFUL TASKS:** Your thesis deals with a future-oriented, socially relevant topic with direct practical relevance in an international environment
- **PRACTICAL RELEVANCE:** With us, you will gain valuable practical experience alongside your studies and actively participate in interdisciplinary projects
- **SCIENTIFIC ENVIRONMENT:** You can expect excellent scientific equipment, modern technologies, and qualified support from experienced colleagues
- **ONBOARDING & TEAMWORK:** You can look forward to working in a dedicated, international, and collegial team. It is important to us that you quickly settle into the team and are given structured training for your tasks. We also support you from the very beginning and make your start easier with our Welcome Days and Welcome Guide: <https://go.fzj.de/welcome>
- **WORK-LIFE BALANCE:** We offer flexible working hours, possible 100% home office, to help you balance your professional and personal life. You also have the option of flexible working (in terms of location), which is generally possible after consultation and in line with upcoming tasks and (on-site) appointments
- **FLEXIBILITY:** Flexible working hours make it easier for you to balance work and study
- **FAIR REMUNERATION:** We will pay you a reasonable remuneration for your thesis
- **FIXED-TERM:** The position is initially for a fixed term of 6 months

In addition to exciting tasks and a collegial working environment, we offer you much more: <https://go.fzj.de/benefits>

Further information on the project is available at:

<https://www.fz-juelich.de/de/ice/ice-2/ice2-forschung/integrierte-infrastruktur/verteilnetze>

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation / identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.

The following links provide further information on diversity and equal opportunities:

<https://go.fzj.de/equality> and on specific support options:

<https://go.fzj.de/womens-job-journey>